



Study Guide for Software Engineering Comprehensive Exam

The software engineering comprehensive exam is broad, topical, and covers material similar to that found in most undergraduate “Introduction to Software Engineering” courses.

Topics

There are seven major topic areas: the five canonical activities of software engineering (requirements, design, construction, testing, and maintenance & evolution), project management, and software process.

Requirements

- Software Requirements
- Requirements Engineering
- Specification Techniques

Design

- Software Design Principles
- High-Level Design
- The Unified Modeling Language

Construction

- Coding Style
- Fundamental Algorithms (e.g., sorting, searching)
- Essential Data Structures (e.g., arrays, lists, trees, hash tables)
- Component Interfaces & Defensive Programming
- Low-Level Design
- Debugging Techniques
- Performance & Portability

Testing

- The Testing Process
- Defect Detection and Removal
- Types of Testing (e.g., white-box, black-box)
- Levels of Testing (e.g., unit testing, integration testing, system testing)
- Testing Tools

Maintenance & Evolution

- Software Maintenance
- Configuration Management
- System Reengineering

Process

- Lifecycle Models (e.g., waterfall, evolutionary)
- Professionalism
- Process Improvement Techniques (e.g., SW-CMM, PSP, XP, RUP)

Management

- Project Management (e.g., planning & scheduling, risk analysis)
- Software Quality (e.g., standards, metrics)
- Cost & Effort Estimation

References

There are a great many textbooks that cover the above material related to software engineering. The following are representative references:

- *Software Engineering* (6th Edition) by I. Sommerville (Addison-Wesley, 2001)
- *Software Engineering: Theory and Practice* (2nd Edition) by S. Pfleeger (Prentice-Hall, 2001)
- *The Practice of Programming* by B. Kernighan and R. Pike (Addison-Wesley, 1999)